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is a chimney seventy-five feet in height, and having a flue about four feet square, which will be amply sufficient to carry away the gases, and to provide good draught to all the boilers together. It is given this height, partly to give a strong natural draught, such as will be needed in investigations of the efficiencies of boilers at different rates of combustion, and to insure that the adjacent buildings, some of which may ultimately be carried up to a considerable height, may not interfere with its action, and may not receive gases blown from its top. The ceiling of these rooms, and floor of the upper portion of the building, are given the standard 'mill construction,' and consist of two floors of yellow pine, separated by an intermediate layer of cement. The floor is carried on heavy beams, and left unlathed and unplastered; the lower surface of the ceiling being given an oil finish, and the beams painted as over the upper apartments.

The structure is an example of a successful attempt to secure large, comfortable, and well-lighted rooms at small cost. The construction is as simple as possible, and the finish is of the most inexpensive character. The result is thoroughly satisfactory, if we may judge from the limited experience so far had with it.

#### CO-OPERATION ON THE CONTINENT OF EUROPE.

##### III.—AUSTRIA, ITALY, BELGIUM, SWEDEN, AND THE NETHERLANDS.

FROM Austria the answers to Lord Rosebery's circular (see *Science*, No. 220) are based on the reports of the inspectors of industries. In Vienna there are several societies founded by workmen, which, from small beginnings, have so developed that they now afford facilities of cheap supply to many thousand families. One of the most important of these associations is the *Arbeiter-Spar-und Consumverein* (Workmen's Saving and Supply Association) in Fünfhaus (registered as an unlimited liability company), founded in the year 1865 by fifteen working-men, and which now contains about 3,800 members. Any person, without distinction of station or sex, can become a member of the association. Nearly half the members, about 1,600, belong to the class of working-men, while the remainder are independent mechanics, tradesmen, small officials, pensioners, widows, etc. Each member pays an entrance-fee of 30 kr. to the reserve fund, and a subscription of 10 fl. for a share.

The members have the right of speaking and voting at the general meetings, of procuring goods at the stores of the society, and of claiming a share in the profits. In addition, each member is allowed to make savings deposits to the amount of 500 fl. These deposits yield an interest of six per cent, and can be withdrawn at any time, together with the interest, on giving notice beforehand. All goods bought must be paid for in cash.

At least five per cent of the net profits are paid to the reserve fund, so long as the latter does not amount to twenty-five per cent of the members' capital. Out of the amount which remains, interest at six per cent is paid on the shares, and, should any further sum remain, it is paid in dividends to members according to the amount of goods purchased by each during the year from the society. The association is managed by the board of directors, the council of inspection, and the general meeting. The board of directors, which is composed of the manager, the cashier, and the goods manager, are elected for a period of three years from among the members in a general meeting. The board of directors represents the society in its public dealings, and is charged with conducting all its business affairs. The members of the board receive a salary. The council of inspection, which is charged with watching over the management of the business by the board of directors, consists of fifteen elected members, who receive no salary. The general meeting has to consider and decide upon all matters of importance which affect the society, and these meetings are held quarterly. The accounts are balanced quarterly.

It seems that the governmental reports furnish no statistics of the number of co-operative societies in the whole of Austria. The only reliable information on the subject is found in a report drawn up in 1881 by Dr. Hermann Ziller, editor of the *Genossenschaft*, the organ of the General Union of Industrial and Provident Societies in Austria, of which union he is the founder and director.

The subjoined table gives the number of co-operative societies in lower and upper Austria, Salzburg, Tyrol, Vorarlberg, Styria, Corinthia, Krain, the seacoast, Bohemia, Moravia, Silesia, Galicia, Bukovina, and Dalmatia, in 1881:—

People's banks.....	1,129
Consumers' societies (selling food, clothing, etc.).....	235
Societies for assisting artisans in buying materials wholesale...	6
Societies for supplying agricultural implements, manure, etc....	14
Raw material and selling-depots.....	2
Selling-depot.....	1
Artisans' producing associations.....	41
Agricultural producing associations.....	61
Building societies.....	5
Trading societies.....	10
Insurance societies.....	2
Various.....	9
Total.....	1,515

All societies in Austria, of which the number of members is unlimited, and which seek to benefit them by carrying on business in common, are required, by a law passed in 1873, to be registered either as limited or unlimited liability companies; the measure of liability in the former case being fixed by their rules, which, however, do not generally make members liable for more than double the value of their shares, and their responsibility terminates by law after their membership has ceased for a year. In unlimited companies the liability extends through the second year after the expiration of membership. In 1881 something less than two-fifths of the societies tabulated above were registered with unlimited, and rather more than two-fifths with limited liability; about one-fifth were unregistered.

People's banks are the most numerous co-operative societies in Austria. As has been already seen in Dr. Ziller's table, there were 1,129 of those associations in 1881. They were unequally distributed over 10 different provinces; Bohemia having 425, Moravia 304, Galicia 140, and Lower Austria 128, the other provinces only contributing in numbers varying from 2 to 33 to the total. About half these societies were unlimited as to liability.

The people's banks may be divided into two groups. The first, the majority, are open to all classes, and their members are generally tradesmen, artisans, and farmers; the minority, which form the other category, are open only to officials. The total number of the latter kind of societies in Austria was 79, more than two-thirds of which are in Lower Austria, the metropolitan province. Only 696 societies made a return of the number of their members, which amounted to 296,648, giving an average of 426 members per society.

Austria has no co-operative societies for shipping or fishing. Of the 61 agricultural co-operative societies, 59 are dairies and cheese-farms. There is one co-operative association for bee-culture, and one for hop-growing. In 1881 five co-operative building societies existed. Their object was to provide dwellings for artisans. They were not financially successful, and are now in liquidation.

In Italy co-operation has gained much ground since 1883, though it has been known for twenty-five years. Before 1883 co-operative institutions were hampered by legal restrictions. The old commercial code did not recognize co-operative societies as such, and they had to exist as limited liability companies. The code of 1883, however, directly recognizes co-operative societies, and regulates their administration.

Instances of various kinds of co-operative associations are now to be found in Italy; but by far the most important, in regard to their numbers, capital, and success, are the co-operative or people's banks (*banche popolari*). Co-operative stores (*società co-operative di consumo*) for the purchase and retailing of provisions, fuel, and other necessities of life, are fairly numerous and successful among the working-classes in cities and towns. In many cases their establishment is due to the initiative of friendly and mutual-benefit societies, and sometimes the two objects are combined by one association.

A law passed in 1870 exempts co-operative societies from the payment of *octroi* (or local entrance dues) "upon goods provided by them for distribution solely among their own members, for purposes of benevolence, and for consumption at the homes of those persons to whom the distribution is made."

This statute led to a considerable increase in the number of co-operative stores, and cases occurred in which the privilege was abused; and the real object of the society itself, or of individual members, was to defraud the *octroi* by introducing goods for purposes of trade. In order to prevent similar occurrences, the constitution of most co-operative store associations expressly forbids the members, under pain of expulsion, from allowing strangers to deal at the store in their name, or from selling the goods obtained there.

No statistics respecting the number or capital of these stores have yet been published.

Co-operative associations for purposes of production exist in Italy under various forms, but they are not very common, though, since the new commercial code came into force, their numbers have increased considerably.

They are generally established by and limited to members of the same trade or occupation, and exist at present among masons, bakers, macaroni-makers, tailors, milliners, rope-makers, printers, etc.

The associations for production are either intended (*a*) for the purchase of raw materials, tools, etc., or (*b*) for the exercise in common of the trade to which they refer, whether in a co-operative workshop or otherwise.

The fundamental difference between the German and Italian co-operative banks consists in the varying degree of responsibility imposed on their members. While the German institutions are based on the unlimited liability of their shareholders, the Italian banks have, from the first, adopted the principle of limited liability. With regard to this difference, Italian writers point out that the assumption of unlimited liability would have deterred persons of means and education, whose assistance at the outset was more indispensable in Italy than in Germany, from becoming members, and at the same time the character and habits of the people themselves would have disinclined them from entering any associations involving so great a risk.

Some co-operative banks with unlimited liability have, it is true, been established in Italy during the last few years, chiefly in Venetia, at the suggestion of Dr. L. Wollenbourg, but these are only about ten in number.

Industrial co-operative stores are very generally established in Belgium, having as their main object the wholesale purchase, and retail sale at wholesale prices, of the chief necessities of life to the working-classes, such as food, clothing, boots, linen, etc. Credit is not usually allowed. A certain portion, sometimes as much as fifty per cent of the profits, is set aside to form a reserve fund, the remainder being shared amongst the members in proportion to the amount of their purchases. A member, on joining one of these societies, is bound to pay in, either at once or by instalments, a certain sum to the fund. Should he not have paid it up when the dividend is declared, his share of the profits is withheld, and goes to complete his contribution.

If a co-operative society has only a small capital, no store need be opened; but contracts are made with the local tradesmen, who, in return for the society's custom, undertake to sell their goods at reduced prices to the members. The usual practice in such cases is for the members to buy their goods at the same price as the public, receiving at the time of purchase a ticket on which is noted the amount of their purchases. The owners bring their tickets at fixed periods to the committee of the society, and receive in exchange their share of the percentages allowed by the society's tradesmen, and paid direct by the latter into the common fund of the society. Such percentages rarely exceed six per cent.

Sometimes, as a substitute for this ticket-system, the societies distribute to their members counters or tokens, representing 5 fr., 2 fr., 50 c., 20 c., such tokens being of a different color for each tradesman. For instance: a member who wants to buy meat obtains from his society a counter in exchange for his money, representing the cost of the meat he requires, which he receives from the society's butcher at the ordinary rate, his purchase being entered in a special register kept by the butcher. At the end of each month the society's tradesmen receive from the committee the money equivalent of these tokens. Supposing that the butcher brings 100 fr. worth of tokens, and has agreed to allow a reduction of 10

per cent, the society pays him 90 fr., and the 10 fr. percentage goes towards the society's general dividend fund.

Both these systems obtain in large cities, where the working-classes are much scattered; but provided the society has sufficient capital, and can open one or more branch depots, the store system is, in the long-run, more advantageous to the members.

One of the most powerful of the co-operative societies in Belgium is the Flemish Vooruit Society, the centre of the socialistic movement in Belgium.

This powerful association counts on its rolls 2,700 heads of families, each of whom is bound to pay a trifling subscription annually to the general fund. The Vooruit is the type and model of all similar institutions in the other Belgian cities, is well administered, owns premises of considerable extent, and has already attained a good financial position. Attached to it is an admirably organized steam-bakery, which sells bread at a somewhat lower price than the other bakers can afford to do, the society guaranteeing to the bakery a minimum profit of at least 10 c. the kilogram. The profits of the bakery are divided as follows: a certain portion is paid into the society's own *caisse de prévoyance*, or provident fund; another into a fund for the support of the workmen in their economical struggles and strikes; a third portion is devoted to the formation of a library; and the remainder is divided amongst the members, who receive the profits in kind, that is to say, in loaves delivered gratis, according to the margin of profit left to be distributed. This division of profits is made twice annually, — at the new year, and at the summer 'kermesse' fair.

In June, 1885, the profits amounted to 43,738 fr. 20 c.; in December last, to 46,233 fr. 80 c. This bakehouse may be regarded as the mainspring of the whole Vooruit organization. It also has a clothing-store, a pharmacy, and two newspapers.

The Vooruit Society intend to push the principle of co-operation to its extreme limits, and has already very seriously crippled the small retail dealers, who formerly enjoyed the custom of the Ghent workmen.

Hitherto no official returns have been published showing the progress of co-operation throughout the kingdom, but the present government have recently re-organized an industrial department in the ministry of agriculture, which, without infringing on the freedom of the societies, will furnish precise statistics respecting all co-operative institutions.

With the exception of the cotton-manufacturing districts in the provinces of Drenthe and Overijssel, there are no great industrial centres in Holland, and, although there is a considerable amount of manufacturing industry in the country, it is too scattered to favor the formation of co-operative institutions; besides which, the southern Catholic provinces of Brabant and Limburg appear up to the present totally inaccessible to any such efforts, which are not encouraged by the clergy. The General Workman's Union of Holland does not number more than 4,000 members, and the efforts made to form regular trades-unions have as yet been attended with but partial success. There are not more than a dozen workmen's co-operative stores in the entire country, and none of them are of any importance.

Co-operative societies exist in certain parts of Sweden where there are large industrial works in the country or in small towns, the workmen subscribing together to buy the stock of supplies wholesale, the same being then sold retail to the members at a cheap rate. Any eventual surplus would probably be divided.

Co-operative stores also exist in Stockholm and other towns copied from the English system. Mr. L. O. Smith, a capitalist and member of the First Chamber, went over to England some years ago, and studied the system as worked at Manchester and other large centres of manufacture, and started the co-called *Arbetsarering*, or Working-Men's Co-Operative Society, with stores and eating-houses, or 'steam-kitchens,' as they are called, where an ample dinner can be obtained for from about four-pence to four and one half pence. These stores have been so far successful that they have lowered the prices of the necessities of life for the working-classes; but the hope of the founders was, that, when once started, the workmen would take over the management of these stores and keep them going. This hope, however, has not been satisfactorily realized. The numbers frequenting the stores and

eating-houses have fallen off, and a tendency to go back to the private shops has manifested itself.

There are numerous co-operative building-societies in Sweden, but the system has not been extended to agriculture, nor, to any considerable extent, to fishing.

#### MENTAL SCIENCE.

##### Healing Wounds by Mental Impressions.

PROFESSOR DELBOEUF of Liège is certainly the most versatile of living investigators, when one considers the great originality and suggestiveness of all the work he does. Ancient and modern languages, logic, general physics and physiology, and especially experimental psychology, have received his attention by turns. His latest contribution is to therapeutics, and is a communication made on June 4 to the Belgian Academy, which will probably turn out to be of the greatest theoretical as well as practical importance.

We all are familiar with accounts of the wounds inflicted on themselves by African dervishes; but the statement which the narrators always make, that the wounds do not inflame, or may even be quite healed in twenty-four hours, probably often tends to discredit their whole description in the reader's mind. Delboeuf's observations now make these stories wholly plausible. It is well established that in certain hypnotic subjects a suggestion made during trance, that to a part of their body a cautery or a blister is applied, will produce, after due lapse of time, an actual vesication of the skin. The hallucinatory feeling of inflammation produces in these persons a genuine inflammation. M. Delboeuf argued from this, that the feeling of pain, however useful in other respects, must itself be an inflammatory irritant, and went on to infer that the abolition of it from an actual wound ought to accelerate its healing. He immediately thought of some hypnotic subjects whom he had made anæsthetic, and in whom he had often admired the rapidity with which the marks of punctures and pinchings disappeared, and proceeded to more systematic experiments, which, so far as they go, seem to verify his hypothesis perfectly. On a young woman whom he could make insensible by suggestion, he marked two corresponding spots, one on each arm, and made on each an identical burn with the hot iron, announcing to the patient that the one on the right should not be felt. The suggestion took effect; and the next day, when the bandages were taken off, and the left arm presented a vesicled sore with an inflammatory area three centimetres in diameter, the right arm showed only a clean scorch of the skin of the exact size of the iron (8 millimetres diameter), without redness or inflammation. On another subject similar results were obtained with burns and blisters, the spots chosen being near together on the same arm or on the neck. The experiments are few in number, and ought to be multiplied; but the reader will immediately see the vista which they open. Many of the results of the 'mind-cure,' and the strange fact, so long known, of opium controlling inflammations, are explained by M. Delboeuf's principle. So is the popular belief in 'hardening' one's self by a little judicious indifference, and neglect of one's condition. Local pain is useful in leading us to protect the wounded part from mechanical abrasion,—several of M. Delboeuf's experiments were inconclusive, because the subjects, being insensible at the seat of their injuries, allowed them to get scraped, etc.,—but it has the drawback of exciting reflex changes of nutrition of an unfavorable kind. Anæsthetizing a wound prevents these reflex changes. M. Delboeuf, suggesting to a very sensitive subject that she should not feel a severe dental operation, was assured by the dentist that what he found most extraordinary in the whole performance was the absence of the salivary secretion which would usually have accompanied it.

It is to be hoped that others, with better facilities for surgical experimentation than a professor of classical literature like M. Delboeuf, will follow the example he has so happily set them.

#### BOOK—REVIEWS.

*Technical School and College Buildings.* By EDWARD C. ROBINS, F.S.A. New York, Van Nostrand. 4°.

THIS handsome volume by a gentleman who holds a most honorable position among architects and friends of technical education, is inscribed to Professor Huxley. It is a treatise on the design and

construction of applied-science and art buildings, together with a description of their suitable fittings and sanitation. Its value will be apparent at once to every one, but especially to those professors and instructors who desire to utilize the results of the best European experience in their laboratories, museums, and lecture-rooms. Our medical and educational readers will recall the pains taken by the trustees of the Johns Hopkins Hospital in Baltimore to obtain the benefit of the best thought and ripest experience of the world in relation to their work, and will readily understand how a book of this scope relating to hospitals would have lightened their labors.

In this country we are now passing rapidly forward in the construction of school-buildings and laboratories, and, whether they are large or small, our desire is to have them as complete as possible. It is here that European experience is so valuable, and Mr. Robins has done us a great service in putting into a readable form accounts of what has been done in the great schools and universities of Europe. His book contains full descriptions of such famous institutions as the Bonn, Berlin, and Munich Chemical Laboratories, Du Bois-Reymond's Physiological Institute at Berlin, the laboratories of the Royal Trade School at Chemnitz, the Würzburg Physical Institute, the Royal Technical School at Stockholm, the laboratories at Charlottenburg, Zurich, Paris, and Strasburg. Most of these are accompanied with cuts and diagrams, so that their interior arrangements may be studied in minutest detail. Following these come full descriptions of the laboratories at South Kensington, Finsbury, Leeds, Bristol, Manchester, Huddersfield, Oxford, Cambridge, and other English cities. The chapters which follow on the fittings of these buildings are in one sense the most valuable of all; for they give us the most detailed information concerning the hundred and one minor things which go to make up the perfect laboratory. They discuss and describe, for example, the working-benches, demonstration-tables, drawing-rooms, and so on. The heating, ventilation, and sanitation of applied-science buildings are also elaborately treated and profusely illustrated. An appendix gives statistics as to the technical schools in Great Britain, and we find there particulars as to the area occupied by the buildings, their cubical contents, the cost of land, cost of fittings, annual expense of maintenance, number of students, and so forth.

Mr. Robins's book is one which our investigators in physics, chemistry, and biology, our university architects, and our technical educators, cannot do without.

*The Natural History of Thought, in its Practical Aspect from its Origin in Infancy.* By GEORGE WALL. London, Trübner. 8°.

THIS volume is in many ways a serious disappointment. Much of this effect is due to the fact that the expectations raised by the inviting titlepage are not in the least realized. Had these pages appeared with a less ambitious title, one could have judged them much more leniently than it is possible to do when considering them as an attempt to write a life-history of the thinking process; and this failure is made a hundred-fold more striking by the consideration that science is in a far better position to deal with this problem than ever before. At no very distant date it will be possible to write a natural history of thought that shall be regarded as an illustrious consummation of a most important movement,—the application (as the term 'natural history' suggests) of the biological point of view to the consideration of mental phenomena. Even now a master-hand could sketch the outlines of such a comprehensive undertaking. To blame Mr. Wall for not being such a master-hand would be very unjust; but the same cannot be said when fault is found with his lack of appreciation of the complexity of the problem before him, and the important light which recent experimentally discovered facts have shed upon it. The natural history of thought can be far better gleaned from such a volume as Mr. Tylor's 'Primitive Culture,' or (to make the comparison more immediate) from M. Perez's 'The First Three Years of Childhood,' than from the pages of Mr. Wall's book.

The volume is really a collection of educational essays, written by an observant thinker, deeply imbued with the high pedagogical value of moral training, and in particular with that portion of it usually termed 'religious,' and appreciating here and there the